

REMARKS

Claims 27-37 and 38-54 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

ELECTION/RESTRICTION

Claims 1-26 and 42-48 stand withdrawn from consideration as being drawn to a non-elected invention. Applicant timely traversed the restriction (election) requirement in the reply filed 14 July 2006. The Examiner reconsidered the *restriction* requirement and made it FINAL. Applicant respectfully requests reconsideration of the *election* requirement since the species identified as Species II-A (claim 38) and the species identified as Species II-B (claim 42) are highly related and should be examined concurrently.

Claims 42-48 are directed to the detailed structure of the ejection failure detecting means recited in claim 38. Claim 42 directly depends from claim 38. Claims 43-48 indirectly depend from claim 38. Claims 42-48 should be examined together with claim 38. Accordingly, examination on the merits of Claims 42-48 is respectfully requested. In this regard, please note that the subject matter of claim 38 is incorporated into claim 27 and the dependency of claims 42-48 is amended to account for the cancellation of claim 38.

REJECTION UNDER 35 U.S.C. § 102

Claims 27-35, 38-40 and 49-54 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yauchi et al. (U.S. Pat. No. 5,500,657). This rejection is respectfully

traversed. Claim 27 is independent. Claims 28-35, 39-40 and 49-54 depend from Claim 27. Claim 38 is cancelled.

Claim 27 calls for a droplet ejection apparatus having a driving circuit, a reciprocating mechanism and a plurality of droplet ejection heads each including a cavity filled with a liquid, a nozzle in communication with the cavity, an actuator, and a diaphragm that is displaced when the actuator is driven, the droplet ejection head ejecting the liquid within the cavity through the nozzle in the form of droplets by driving the actuator by means of the driving circuit to change an internal pressure of the cavity while moving the plurality of droplet ejection heads relatively with respect to a droplet receptor by the reciprocating mechanism so that the ejected droplets land on the droplet receptor, the droplet ejection apparatus comprising: ejection failure detecting means for detecting an ejection failure of the droplet ejected through each of the nozzles and causes thereof, the causes of the ejection failure that the ejection failure detecting means can detect including: intrusion of an air bubble into the cavity; thickening of the liquid in the vicinity of the nozzle due to drying; and adhesion of paper dust in the vicinity of an outlet of the nozzle, wherein the ejection failure detecting means being constructed to detect a residual vibration of the diaphragm and then determine an ejection failure and a cause thereof based on a vibration pattern of the detected residual vibration of the diaphragm; counting means for counting the number of ejection failures detected by the ejection failure detecting means; and recovery means for carrying out recovery processing for the droplet ejection heads to eliminate the cause of the ejection failure of the droplet; wherein the ejection failure detecting means detects the ejection failure with respect to a droplet ejection operation of each droplet ejected through the

nozzles when the plurality of droplet ejection heads eject the droplets onto the droplet receptor, and wherein, in the case where the number of ejection failures with respect to the droplet receptor counted by the counting means exceeds a predetermined reference value, the droplet ejection apparatus interrupts the ejection of the droplets onto the droplet receptor and make the recovery means carry out the recovery processing in accordance with the cause of the ejection failure.

Yauchi et al. discloses an air bubble detection apparatus 7 which detects the presence or absence of the occurrence of air bubbles in an ink passage 3 by detecting if the voltage which develops across an electrostrictive vibrator 5 by mechanical strain is a result of the ink in the ink passage of an ink recording head being moved, exceeds an excess voltage above a drive voltage.

In contrast, the droplet ejection apparatus of the claimed invention, the ejection failure detecting means is constructed to detect a residual vibration of the diaphragm that is displaced when the actuator is driven and then determines an ejection failure and a cause thereof based on a vibration pattern of the detected residual vibration of the diaphragm. In the office action, the Examiner states in connection with claim 38 that Yauchi discloses that each of the droplet ejection heads includes a diaphragm (Fig. 1, element 2) that is displaced when the actuator is driven, and wherein the ejection failure detecting means detects a residual vibration of the diaphragm (Fig. 3c, i.e. ink is coupled to Fig. 1, element 2 which is coupled to Fig. 1, element 5) and determines an ejection failure and a cause thereof based on a vibration pattern of the detected residual vibration of the diaphragm (column 6, lines 3-14) (see page 6). However, as stated in the above, in Yauchi et al., the presence or absence of the occurrence of air bubbles in

an ink passage 3 is detected by monitoring a voltage at the drive point 5a of the electrostrictive vibrator 5 by means of air-bubble detection circuit 7 (column 6, lines 15 to 18), which is completely different from the claimed invention in which the presence or absence of air-bubbles and the like are detected by monitoring the vibration pattern of the detected residual vibration of the diaphragm. In this regard, it is to be noted that the wave form shown in Fig. 3(c) and referred to by the Examiner is the voltage at the drive point 5a of the electrostrictive vibrator 5. Therefore, Applicant respectfully submits that the claimed invention is different from Yauchi et al.

Further, Yauchi et al. can detect only the presence or absence of the occurrence of air bubbles, while the claimed invention can detect not only intrusion of an air bubble into the cavity but also thickening of the liquid in the vicinity of the nozzle due to drying and adhesion of paper dust in the vicinity of an outlet of the nozzle. Therefore, Applicant respectfully submits that the claimed invention is different from Yauchi, et al. for this reason as well.

Furthermore, the counter circuit 45 (Fig. 8) of Yauchi et al. is provided for counting printing unit positions from the start of the movement of the ink jet recording head to the position where air bubbles are detected. Further, the counter circuit 45 is constructed to increment by 1 on the basis of the high electrical potential drive timing signal when air bubbles are not detected. When air bubbles are detected, the counter circuit 45 retains the counted value regardless of the status of the high electrical-potential drive timing signal. In contrast the counting means of the claimed invention is provided for counting the number of ejection failures detected by the ejection failure detecting means, wherein the ejection failure detecting means detects the ejection

failure with respect to a droplet ejection operation of each droplet ejected through the nozzles when the plurality of droplet ejection heads eject the droplets onto the droplet receptor, and wherein, in the case where the number of ejection failures with respect to the droplet receptor counted by the counting means exceeds a predetermined reference value, the droplet ejection apparatus interrupts the ejection of the droplets onto the droplet receptor and makes the recovery means carry out recovery processing in accordance with the cause of the ejection failure. For this reason as well, Applicant respectfully submits that the claimed invention is different from Yauchi et al.

For at least the reasons stated in the above, Applicant respectfully submits that Yauchi et al. is completely different from the invention recited in claims 27-35, 39-40 and 49-54 and therefore Yauchi et al. cannot anticipate the claimed invention.

REJECTION UNDER 35 U.S.C. § 103

Claims 36 and 37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yauchi et al. (U.S. Pat. No. 5,500,657) in view of Girones et al. (U.S. Pat. No. 6,238,112). Claim 41 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yauchi et al. (U.S. Pat. No. 5,500,657) in view of Isayama (U.S. Pat. No. 4,034,380). These rejections are respectfully traversed. Claims 36, 37 and 41 depend from claim 27. These claims should be allowable for at least the same reasons as set forth above. That is, Applicant respectfully submits that Yauchi et al. is completely different from the claimed invention and therefore even if other references such as Girones et al. and Isayama are combined with Yauchi et al., the combination fails to yield the claimed invention.

DOUBLE PATENTING

Claim 27 stands provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4 and 5 of copending Application No. 10/797,595. Although Applicant does not necessarily agree, Applicant submits a terminal disclaimer herewith. Accordingly, this rejection should be moot.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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